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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/776,329	02/02/2001	Sean M. Seutter	AMAT/5192/ISM/CORE MCVD/S	9575
32588	7590	02/13/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/776,329

Applicant(s)

SEUTTER ET AL.

Examiner

Toniae M. Thomas

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-8,11-23 and 32-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,4-8,16-23,32-36 and 45-47 is/are allowed.
- 6) ☒ Claim(s) 2,11-15 and 37 is/are rejected.
- 7) ☒ Claim(s) 38-44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is responsive to the amendment filed on 30 October 2003. Currently, claims 1, 2, 4-8, 11-23, and 32-47 are pending. The indicated allowability of claims 37-44 is withdrawn upon further consideration of the reference to Gates et al. (US 6,203,613 B1), which was relied upon in the previous Office action. A Rejection of claim 37 based on the reference follows. The indicated allowability of claims 11-15 is also withdrawn. A rejection of claims 11-15 under 35 USC 112, second paragraph follows.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. *Claims 2 and 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Claim 2, which depended from claim 1, recites the limitation "wherein the first precursor and the second precursor are delivered sequentially to form the tantalum nitride film." If the precursors are co-reacted, as recited in claim 1, it is unclear how the precursors can be delivered sequentially. The co-reacting of the first and second precursors to form a tantalum nitride film, implies that the precursors are delivered to the process chamber simultaneously.

Claim 11 recites the limitations "providing a first reactive tantalum containing gas to the chamber"; and "chemisorbing a first layer on the substrate at least in partial response to the first reactive gas, the first layer selected from a first tantalum layer and a first nitride layer." If the first reactant is a tantalum containing gas, it is unclear how the first chemisorbed layer can be a nitride layer.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. *Claim 37 is rejected under 35 U.S.C. 102(e) as being anticipated by Gates et al. (US 6,203,613 B1).*

The Gates et al. patent (Gates) discloses a method of film deposition for integrated circuit fabrication (col. 5, line 55 – col. 7, line 42 and col. 10, lines 25-52). In one embodiment, the film is a tantalum nitride film, wherein $\text{Ta}(\text{NO}_3)_5$ is used in place of $\text{Ti}(\text{NO}_3)_4$ as the first reactive gas (col. 10, lines 48-52). The method comprises the following steps: providing a process system, the process system having a chamber (col. 10, lines 36-37); locating a substrate in the process chamber (col. 10, lines 36-37);

providing a tantalum containing gas to the chamber (col. 10, line 41);¹ providing a nitrogen containing gas to the chamber (col. 10, line 43); and chemisorbing tantalum and nitrogen from the tantalum containing gas and the nitrogen containing gas to provide a tantalum-nitride layer on the substrate (col. 10, lines 48-52).

Allowable Subject Matter

4. *Claims 1, 4-8, 16-23, 32-36, and 45-47 are allowable.* Claims 1 and 45-47 are allowable because the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises the step of co-reacting a first precursor and a second precursor to form a tantalum nitride film. Claims 4-8, and 16-23 are allowable because the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises a plasma annealing step. Claims 32-34 are allowable because the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises the steps of: co-reacting a tantalum containing precursor and a nitrogen containing precursor to provide a tantalum nitride layer, and plasma annealing the resulting tantalum nitride layer. Claim 35 is allowable because the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises the steps of: providing a plasma source gas containing nitrogen, igniting the

¹ As stated previously, where the metal nitride film is tantalum nitride, Ta(NO₃)₅ is used in place of Ti(NO₃)₄ as the first reactive gas (col. 10, lines 48-52).

plasma source gas to provide a plasma, and co-reacting a tantalum containing gas and the plasma to chemisorb a tantalum nitride layer. Claim 36 is allowable because the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises the steps of: providing a plasma source gas containing nitrogen, and igniting the plasma source gas to provide a plasma.

5. Claim 11 would be allowable if rewritten or amended to overcome the rejections under 35 U.S.C. 112, second paragraph, set forth in this Office action. Claims 12-15 would be allowable if rewritten to overcome the rejection under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of base claim 11 and any intervening claims. Claims 11-15 would be allowable if rewritten or amended to overcome the 112, second paragraph rejection, since the prior art of record does not anticipate, teach, or suggest a method for depositing a film substantially as claimed, wherein the method comprises providing tantalum containing gas, wherein the tantalum containing gas comprises a tantalum based organo-metallic precursor or derivative thereof.

6. Claim 2 would be allowable if rewritten to overcome the rejection under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of base claim 1 and any intervening claims. Claim 2 would be allowable if rewritten or amended to overcome the 112, second paragraph rejection for reasons given above regarding claim 1.

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7. Claims 38-44 are objected to as being dependent upon rejected base claim 37, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1675.

TMJ

25 January 2004



Michael Trinh
Primary Examiner

Act 1/26/04